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IS 11254 (2009): Code of Practice for Dispensation of Aviation Fuel and Allied Products [PCD 3: Petroleum, Lubricants and their Related Products]



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“Knowledge is such a treasure which cannot be stolen”

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विमानन ईंधन एवं सम्बद्ध उत्पादों के
वितरण की रीति संहिता
(पहला पुनरीक्षण)

Indian Standard

CODE OF PRACTICE FOR DISPENSATION OF
AVIATION FUEL AND ALLIED PRODUCTS
(*First Revision*)

ICS 73.160.20

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1999

Price Group 4

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Petroleum Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was first published in 1984. The present revision has been taken up to update it in tune with international practice. In this version (first revision) fuelling procedure, switch refuelling, defuelling procedure, fuel spill-prevention and control data to be obtained prior to the arrival of the aircraft and definitions in more terms, etc, have been added. Fuelling place, fuel spillage, etc, have been modified.

This code has been prepared for the guidance of all the personnel concerned with the fuelling of aircraft. The intention is to encourage use of standard procedures which will help to reduce the hazards to minimum during the fuelling of aircrafts.

In the formulation of this code, assistance has been derived from the following publications:

- a) Aircraft Fuelling: Fire Prevention and Safety Measures for the Fuelling of Aeroplanes and Helicopters: 1979 Edition: Civil Aviation Authority, London (UK).
- b) Advisory circular of FAA-AC No. AC150/5230-3 dated 8/4/69.
- c) Advisory circular of FAA-AC No. AC150/5230-4 dated 27/8/82.
- d) Aircraft Manual (India), Vol 1, Revised edition up to 31 March 1995.
- e) Aircraft Refuelling, 1971 edition, issued by Burmah Shell (Printed by Tonbridge Printers Ltd, Kent), UK.
- f) Refuelling and Quality Control Procedures for Airport Service and Support Operations by NATA.
- g) Aviation Quality Control Manual, 1985, Indian Oil Corporation Ltd, Bombay, India.

Indian Standard

CODE OF PRACTICE FOR DISPENSATION OF AVIATION FUEL AND ALLIED PRODUCTS (*First Revision*)

1 SCOPE

1.1 This code prescribes the procedures adopted for the dispensation of aviation fuel and similar products of an aircraft, outside the hangers. These standard procedures are recommended to provide guidance to the aircraft operators, oil companies and other concerned authorities in order to minimise the hazards arising out of fuelling operations.

1.2 Much of this guidance will also apply to fuelling of aircraft on water and to cases of maintenance of aircraft fuel systems, but supplementary instructions may generally be necessary to provide for specific cases.

2 NORMATIVE REFERENCES

The following Indian Standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
5896	Code of practice for selection, operation and maintenance of special fire fighting appliances:
(Part 1) : 1970	Combined foam and crash tender
(Part 2) : 1975	Escapes
(Part 3) : 1975	Turntable ladders
7667 : 1975	Code of practice for handling and storage of aviation fuels at airfield fueling station

3 DEFINITIONS

For the purpose of this standard the following definitions shall apply.

3.1 Fuelling shall mean all fuel transfer activities, such as fuelling, defuelling, and draining of aircraft fuel tanks come the aircraft orientation on wheels.

3.2 Fuelling Zone or Precautionary Area — is regarded as the area extended 6 metres radially from the aircraft fuelling point, venting point and fuelling equipment in case of straight kerosine (ATF) and 15 metres in case of gasoline or wide cut fuels.

3.3 Danger Zone — is regarded as the area within the largest polygon obtainable by joining points 3 metres away from the wings and the fuelling vehicle.

3.4 Hydrant Vehicle — means a vehicle equipped with facilities to transfer fuel between an aircraft fuel hydrant and an aircraft.

3.5 Fueller — means a tank vehicle (tank truck, tank fuel trailer, tank semitrailer) designed for and employed in the transportation and transfer of fuel into or from an aircraft.

3.6 Apron — means an area or position at an airport used for the fuel servicing of aircraft.

3.7 Airport Fuelling System — means an arrangement of aviation fuel storage tanks, pumps, piping and associated equipment such as filters, water separators, hydrants, cabinets and pits installed at an airport designed to service aircraft at fixed positions.

3.8 Deadman Control — means a device which requires a positive continuing action of an operator to allow the flow of fuel.

3.9 Hydrant — means an outlet in an airport fuelling system designed to permit the transfer of fuel to a hydrant vehicle or a tank vehicle after the matching fuel connection on the dispensing equipment is properly attached.

3.10 Switch Fuelling — denotes the practice where fuels having a flash point of less than 38°C are mixed with fuels having a flash point above 38°C either by addition of the higher flash fuel to the lower flash fuel or *vice versa*.

4 GENERAL

4.1 The aviation fuel dispensation equipment shall conform to the relevant Indian Standard specifications or any other approved standards agreed to between the oil company and the aircraft operator. T

and other products delivered by the oil companies shall be of a quality already agreed to between the purchaser and the supplier.

4.2 All the statutory rules regarding transportation, storage and handling of aviation fuels and similar products (*see* IS 7667) and for illumination of the fuelling zone as agreed by an appropriate authority (DGCA) shall be followed by the concerned personnel.

4.3 No leaking or defective fuelling equipment shall be used.

5 SUPERVISION OF FUELLING

The fuelling of an aircraft shall be done under the supervision of an approved aircraft operator (referred to as Fuelling Operator) (*see also* 17.2) and also under an approved person from the oil company. The fuelling operator shall ensure that the fuelling of an aircraft is carried out in accordance with the prescribed manner, following the conditions laid down by the aircraft manufacturer. The approved personnel shall not move from the place of fuelling leaving the aircraft and fuelling vehicles unattended.

6 FUELLING CONDITIONS

The aircraft operator shall furnish written instructions to the fuelling company regarding the correct procedure of fuelling and precautions to be taken for particular types of aircraft. These instructions shall include the fuelling pressure, rate of delivery, etc. Special precautions such as in the case of switch refuelling (*see* 18) shall also be intimated to the oil company in advance. All special conditions and requirements of aircraft manufacturers during their servicing and fuelling shall be followed by all concerned.

7 FUELLING PLACE

7.1 The refuelling of an aircraft shall be done in an open place as approved by the aerodrome or other concerned authorities. As a general guide the following precautions shall be observed:

- a) Fuelling places shall not be less than 15 metres from any building (aerobridge need not be considered as a part of the building).
- b) A "NO SMOKING" notice shall be prominently displayed.
- c) Smoking or use of an appliance employing naked flame or use of an appliance capable of producing a spark or in any other way igniting fuel vapours shall not be permitted within 30 meters of the aircraft or fuelling equipment.
- d) Aircraft engines shall not be started or turned and ignition switches be placed in the "OFF" position.

e) Aircraft electrical radar and radio systems shall not be operated and the switches relating thereto shall remain in the "OFF" position. Provided that this clause shall not apply to electrical switches controlling the following circuits:

- i) Power and light essential for fuelling operations;
- ii) Minimum amount of cabin lighting; and
- iii) Steady parking lights. Parking light switches shall not be operated during fuelling operations.

7.2 The use of ground power supply units, air-conditioning units, tractors and similar equipment shall be permissible subject to compliance with the following conditions:

- a) Flexible training cables suitable for use in hazardous areas shall be used.
- b) They shall be located outside the Danger Zone.
- c) The units, including the associated electrical equipment, shall be flame-proof and of a type approved by the Chief Inspector of Explosives, otherwise they shall be stationed at a distance of not less than 15 metres, in the case of gasoline or wide cut fuels and 6 metres in the case of straight Kerosene (ATF), from the aircraft and the fuelling vehicle.
- d) They shall not be switched "ON" or "OFF" during fuel transfer.

7.3 The aircraft shall not be fuelled within 30 metres of radar equipment under test or in use in aircraft or ground installations.

7.4 The refuelling shall be carried out on a level surface as far as possible.

7.5 The fuelling operator shall ensure that there is adequate restraint of the aircraft by checking that the brakes are applied and the wheel chocks are placed properly before the fuelling operations are started.

7.6 Unauthorized persons shall not be permitted in the fuelling area under any circumstances.

8 DATA TO BE OBTAINED PRIOR TO ARRIVAL OF AIRCRAFT

The fuelling supervisor should obtain as much advance data as possible in order to service the aircraft promptly and efficiently upon arrival. This includes:

- a). Aircraft arrival and departure times.

- b) Estimated quantity and grades of product required.
- c) Determine fuelling method (hydrant, refueller, overwing, underwing, etc).

9 APPROACH TO AN AIRCRAFT

The aircraft should not be approached until it is stationary, the main engines have been shut down, and it is ready for servicing. Helicopters must not be approached until blades stop rotating. Consideration should be given to the location of the fueller's engine and location of the aircraft's fuel vent system. The fuelling vehicle should not be positioned where it would obstruct aircraft exit and loading areas. The equipment driven shall be marshalled in position. Similarly withdrawal of refuelling equipment shall be done under supervision. The refuelling equipment shall never be reversed towards the aircraft.

10 POSITION OF FUELLING EQUIPMENT

10.1 The fuelling equipment shall be placed in such a way that a clear exit path is maintained all round the equipment to and from the aircraft to allow its quick removal in case of need.

10.1.1 In such cases when the fuelling vehicle is parked under the aircraft shall be ensured that any accidental spillage from the aircraft air vent does not fall on the fuelling equipment.

10.2 The vehicles and equipments shall not be placed where they may cause obstruction to the evacuation of persons from occupied portions of the aircraft in case of emergency.

11 MANNING OF FUELLING VEHICLES

Every refuelling vehicle shall be manned by at least one competent person. The operation of the vehicle shall be done only by the competent person(s). Adequate manpower shall be available to the competent person(s) in order to shut off the flow of fuel and or manoeuvre/retreat the equipment in case of an emergency.

12 FUEL QUANTITY DELIVERY

The exact quantity of fuel in terms of volume along with its break up distribution in various tanks, if desired shall be detailed to the oil company representative. The oil company representative shall give a due *challan* on the quantity of fuel refuelled in the aircraft. The density of fuel supplied shall be declared on this *challan*, if so desired.

13 APPROVAL OF FUEL SAMPLES AND STARTING OF FUELLING

Fuelling of an aircraft by the oil company shall be started only after the fuel samples have been approved

by the aircraft operator and a clearance has been given to the oil company to start the fuelling operations.

14 FUELLING PROCEDURES — UNDERWING

The following procedures are to be followed in underwing servicing from fuellers and hydrant vehicles :

- a) Ground and bond fuelling vehicles to ground and to aircraft (*see 23*).
- b) Hydrant servicers only:
 - i) Open hydrant pit cover (check the product grade before connection).
 - ii) Place "warning" signs or lights in position at hydrant box.
 - iii) Remove dust caps from valve in hydrant box and from coupler of inlet hose.
- c) Open aircraft fuelling station access door and remove dust covers from hose nozzle and aircraft valves.
- d) Connect delivery hose nozzle to aircraft fuelling point, open nozzle and place appropriate aircraft fuel switch to the "on" position. Connect the hose coupler to the hydrant valve after checking both valve surfaces to be sure they are clean and dry, then open hydrant coupler and adapter and activate fuelling vehicle with deadman control.
- e) Start fuelling-keep alert and take all precautions for safety and be sure not to exceed aircraft structural fuel pumping pressure.
 - i) Continually monitor the underwing fuel gauges and be in a position to quickly shut off flow in an emergency.
 - ii) Never block a deadman valve in the "on" or open position. Under no circumstances shall the nozzle be left unattended during fuelling.
- f) Never overlook the possibility of an accidental fuel spill or leak from the aircraft or the fuelling vehicle.
- g) Upon completion of fuelling:
 - i) Check fuel quantity dispensed with fuel quantity requested.
 - ii) Disconnect hydrant coupler and stow hoses.
 - iii) Disconnect hose nozzle and replace dust caps.

- iv) Close fuelling station access door.
- v) Remove ladders or lower platform.
- vi) Remove bond cable from aircraft to fuelling vehicle and ground cable from ground to fuelling vehicle.
- h) Check the filter/separator sump on fuelling vehicle for water, following the fuelling. If an unsatisfactory check is found, request an airline representative to check aircraft sumps, drain any water found and acknowledge that aircraft is water free.
- j) Remove fuelling vehicle from aircraft area as soon as possible after servicing is completed.

15 FUELLING PROCEDURES — OVERWING

In addition to the procedures given for underwing, where applicable, the following should also be applied:

- a) Always use suitable ladders and mats to avoid damage to aircraft wing. Use extreme care to prevent hose or nozzle from damaging deicer boot or leading edge of wing.
 - b) Set wing mat in place.
 - c) Connect static bonding wire from nozzle to receptacle, post or other metal part of plane before opening fuel tank cover.
 - d) Open tank access, remove nozzle dust cap and insert nozzle, keeping constant contact between the nozzle and the filler neck while fuelling.
 - e) **Start fuelling** — Overwing nozzles should not be equipped with “hold open ratchets” which will prevent nozzle from being unattached during delivery. Make frequent visual checks of tank capacity, taking extreme care to prevent spillage or overfilling.
 - f) Upon completion of delivery, quantity in tank should be checked with fuel quantity requested.
 - g) Replace and secure tank access caps. Disconnect nozzle static bond wire. Replace nozzle dust cap.
 - h) Return hose to fueller reel.
- 16.2 In the case of wide cut turbine fuels are involved and/or the fuel does not contain anti-static additive, it is advisable to disembark the passengers before fuelling.
 - 16.3 The decision to allow passengers to embark, disembark or remain on board during fuelling is the responsibility of the airline and following precautions shall be exercised by the airline concerned:
 - a) Fixed wing aircraft with a seating capacity of less than 20 shall not be permitted to be refuelled with passengers on board.
 - b) Passengers should be warned that fuelling will take place and that they shall not smoke, operate switches or otherwise produce sources of ignition.
 - c) The ‘No smoking’ and ‘Exit’ signs should be illuminated.
 - d) Provision is made for safe evacuation of passengers *via* at least two of the passenger embarkation and disembarkation doors in the event of an emergency. A responsible person should be positioned at each door in order to supervise evacuation of passengers, if needed.
 - e) If during fuelling, the presence of fuel vapour is detected in the aircraft interior, or any other hazard arises, fuelling should be stopped.
 - f) Ground servicing activities and work within the aircraft should be conducted in such a manner that they do not create a hazard or obstruct exits.
 - g) Access to and egress from the areas where aircraft escape chutes may be deployed should be kept clean.
 - h) When passengers are embarking or disembarking during fuelling, their route should avoid areas where fuel vapours are likely to be present and be under the supervision of an airline official. ‘No smoking’ should be enforced strictly during such passenger movements.

16 FUELLING WITH PASSENGERS ABOARD AND DURING EMBARKATION AND DISEMBARKATION

16.1 To reduce transit time and for security reasons, sometimes airlines allow passengers to embark and disembark or remain on board during fuelling operations.

17 HELICOPTERS

17.1 Because of design features of helicopters, namely, close proximity of fuel intake and tanks to the passenger compartments, it is recommended that passengers should not be allowed to remain in the aircraft and be away from the fuelling zone when fuelling is in progress. Engines should not be operated when fuelling is in progress.

17.2 In certain such cases when engines are kept running (*see also* 17.1 and 30.3) for example, severe weather and wind conditions experienced on off shore oil rig platform when quick turn round or some other operational aspect requires engines to be running as the fuelling is in progress, the commander of the aircraft shall be responsible for the overall direction of fuelling operations.

17.3 Fuelling involving gasoline or wide cut turbine fuels not containing antistatic additives shall not be carried out when the engines are running.

17.4 Fuelling involving gasoline or wide cut turbine fuels containing antistatic additive shall be carried out whilst engines are running only if the exhaust system is at higher level than filling port of the aircraft or on the opposite side of the aircraft.

18 SWITCH REFUELLING

18.1 The resulting fuel air vapours in switch refuelling have new and usually broader flammability characteristics, thus increasing chances of an ignitable mixture. In such cases there is an increased risk of fire and explosion unless adequate precautions are taken to prevent ignition from any source of flammable fuel-air vapours in the fuel tank. The following procedures are to be followed in case of switch refuelling of aviation turbine fuel.

18.1.1 Aircraft Operators using ATF shall inform the fuel vendor before refuelling whenever fuel in the tank(s) of a particular aircraft is likely to be a mixture of kerosene type fuel and other type, the latter not being less than 5 percent. This shall be done in writing.

18.1.2 The fuel vendor shall reduce the refuelling rate by 50 percent of the normal refuelling rate whenever switch refuelling is to be effected. Additionally, the release documents pertaining to the particular refuelling shall indicate the words "switch refuelling" to indicate that refuelling at the stipulated reduced fuel flow rate was carried out.

18.1.3 The fuel vendors shall obtain an assurance from the Foreign Airlines they serve to the effect that the Airlines shall inform them whenever switch refuelling is to be effected.

19 DEFUELLING PROCEDURES

19.1 Defuelling an aircraft may be required for a load adjustment or maintenance work. The safety procedures are similar to those used in fuelling and the same precautions must be observed.

19.2 In making a load adjustment, defuelling normally follows shortly after the aircraft has been fuelled. This may be caused by a change in flight plans or aircraft loading.

19.3 Defuelling for maintenance work will normally require the aircraft tanks to be emptied.

19.4 It is desirable to defuel into empty vehicles when possible, but product removed for load adjustment may be defuelled into a refueller equipped for this purpose and may be commingle to a fuel of the same type to a ratio of up to 10 percent with the contents of the vehicle.

19.5 Defuelled product that is withdrawn under the following conditions shall be defuelled into an empty refueller and handled as contaminated fuel and not returned to any aircraft :

- a) Known to be suspected of being contaminated.
- b) Unknown grade of fuel or mixtures.
- c) Fuel removed due to accident or other unusual conditions.

19.6 Defuelled product shall be held in the defuelling unit and returned to either the aircraft from which it was removed or to other aircraft of the same customer.

20 FUEL SPILLAGE

20.1 Fuel spills present an extremely hazardous fire potential and should be handled as such. Because of the many variables, no two spills will present identical hazards, so no set of instructions will apply in every case. However, prompt action, good judgment and initiative will always be required.

20.2 If fuel is discovered spilling from fuel service equipment or from the aircraft itself, the fuel servicing shall be stopped immediately by release of the deadman control or by operation of the emergency fuel shutoff. Every spill, no matter how small, should be reported to the supervisor and the remedial action taken. The supervisor should determine if the operations in progress can be continued safely or if they should be stopped until the nature of the problem is determined and corrected.

20.3 Spill Size

20.3.1 Any fuel spill presents a potential fire hazard. Pint size spills require no emergency action, other small spills involving an area from 45 cm to 2 metres in any dimension require, as a minimum of protection, the posting of a fire guard to maintain a restricted area around the spill and to keep out unauthorized persons. The fire guard should be equipped with atleast one dry chemical or carbon dioxide extinguisher. Dry chemical extinguishers are well suited to these circumstances and have a much greater effective range.

20.3.2 Any spill approximately 2 metres in any dimension or of a continuing nature is extremely hazardous. The airport emergency fire crew should be called at once. If an emergency crew is not available, airport personnel should mobilize all available firefighting equipments as standby protection. The equipment and assistance of other fire protection units should also be requested.

20.3.3 If the spill is large, the passengers and crew should be directed to evacuate the aircraft. The location of the spill, its direction of flow, the wind, etc, will determine the least evacuation route.

20.4 Spill Clean Up

20.4.1 Small spills should be cleaned up as quickly as possible with absorbent cleaning agents, emulsion compounds, or rags. The use of absorbent cleaning agents or emulsion compounds are preferred because they can be applied with less risk to the cleanup crew. Contaminated absorbents and fuel soaked rags act as wicks and should be placed, in metal containers with self-closing lids until burned at a safe location or otherwise disposed of.

20.4.2 Large spills of gasoline should be blanketed with foam. The spill should then be washed away with water and any residue allowed to evaporate before the area is again used for normal operations. These fuels should not be washed down sewers or drains unless no alternative is available, since this merely moves the hazard to another location. If such action must be taken, it should be only on orders from the chief of the airport fire department. If the spillage should get to the sewers, the sewers should be very liberally flushed with water, and operations involving ignition sources should be kept away from the vicinity of open drains and manholes. All recoverable fuel spillage should be disposed of properly.

20.4.3 Kerosene type fuel does not evaporate quickly and hence can be a fire hazard for a prolonged period. It should be blanketed with foam if it is feared that ignition is probable without this protection. In most situations, however, it is better to use an emulsifying agent to remove any oily residue from the surface, and then flush the mixture away.

20.4.4 Every fuel spill should be investigated to determine the cause, whether emergency procedures were properly carried out, and what corrective measure are required.

21 FUEL SPILLS — PREVENTION AND CONTROL

21.1 Fuel spills are often the result of improper or careless operation of fuelling equipment and lack of

preventive maintenance of the fuelling equipment. Therefore, it is imperative that operating personnel comply with the company procedures established to govern fuelling operations and report any leakage of the equipment used during the fuelling operations to supervisory personnel.

21.2 Self-discipline on the part of every man on the fuelling crew to prevent fuel spilling. Operating personnel are required to:

- i) wedge the nozzle trigger in an open position.
- ii) Devote full attention to the fuelling operation.
- iii) Frequently check the amount of fuel in the tank to prevent overfilling.
- iv) Understand the operations of the automatic and deadman switches or shutoff valves in the aircraft fuel system; precheck or verify their operating conditions; and constantly monitor their operations when using underwing filling procedures.
- v) Stop the flow of fuel immediately upon discovering leakage or spillage from the fuel servicing equipment.
- vi) Always ensure pump selector valve is in "OFF" position prior to changing nozzle from over-wing to under-wing or vice versa using the quick-disconnect coupling.

22 SPECIAL PRECAUTIONS TO BE TAKEN IN THE FUELLING ZONE

22.1 Within fuelling zone, smoking, the use of naked lights or operation of switches on lighting systems of other than approved pattern shall be forbidden.

22.2 Unless fuelling takes place in a designated 'No Smoking Area', 'No Smoking' signs shall be predominantly displayed not more than 15 metres away from the fuelling equipment and aircraft tank vents.

22.3 Persons engaged in fuelling operations shall not carry matches or other means of ignition. They shall also not use footwear with exposed iron or steel studs, nails and lips.

22.4 Equipment with all metal wheels or rod capable of producing sparks shall not be moved in the fuelling zone while fuelling is in progress.

22.5 Aircraft borne auxiliary power units (APUs) which have an exhaust influx discharging into the zone shall be started before filler caps are removed or fuelling connections made. If an APU has stopped for any reason, it shall not be started when the fuelling is continuing and there is a risk of fuel vapour ignition.

22.6 Ground Power Units (GPUs) whenever used shall be positioned not less than 6 metres from the aircraft filling and venting points and the fuelling equipment.

22.7 Only approved vehicles and equipment shall be run in the fuelling zone. These vehicles and equipments shall be subjected to regular inspection and maintenance to preserve their safety characteristics (*see also 27*).

22.8 Exhaust of the refuelling vehicle shall not pass over the fuelling hose.

23 SAFETY PRECAUTIONS AGAINST STATIC ELECTRICITY DISCHARGE BONDING AND EARTHING

23.1 Efficient bonding between the aircraft and the fuel supply source is very much essential for the prevention of fire risk due to static electricity discharge during fuelling.

23.2 Before transfer of fuel commences, following procedures shall be carried out in respect of bonding the fueller and the aircraft.

23.2.1 Attach a grounding cable from the fuelling vehicle to satisfactory ground connect. Ideally, earthing should be through apron earthing points designed for this purpose.

23.2.2 Connect a grounding cable from the ground to the aircraft fitting, if one is provided, or any convenient unpainted metal point on the aircraft:

23.2.3 Bond the vehicle to the aircraft. Where a 'Y' or 'V' cable permanently attached to the fuelling vehicle is used to accomplish (23.2.1) and (23.2.2) above, a separate bonding cable is not necessary.

23.2.4 When refuelling from drums, barrels or similar equipment is carried out, similar precautions shall be taken to bond the pumping equipment, hose nozzle and fuel container.

23.2.5 Whenever funnels are used, they shall be bonded both to nozzle of hose or can and to the aircraft. If a chamois leather is used, the metal ring around the leather shall be bonded to the funnel.

23.2.6 The fuel opening shall not be opened before bonding connections are made. Similarly, at the end of the fuelling operations, first the fuel opening shall be closed, fuelling coupling disconnected or the fuelling nozzle removed as the case may be and then only shall the bonding connections be broken.

23.2.7 In case of pressure fuelling, metal to metal contact between the aircraft filling and the fuelling hose coupling shall be ensured. In addition a bonding pin or clip from the fuelling hose coupling to the aircraft structure near the fuel receptacle may be used to provide additional safeguard.

23.2.8 Whenever wing fuelling is employed the nozzle of hose shall be bonded to the aircraft structure before the filler cap is removed.

23.2.9 All cables, clips and plugs used for bonding or earthing shall be maintained in proper condition and regularly tested for electrical continuity.

24 SAFETY PRECAUTIONS AGAINST FIRE HAZARD

24.1 When any part of under carriage assembly has become abnormally heated during landing or taxing, the aircraft shall not be fuelled until heat has dissipated. Fuelling equipment shall not be positioned until the fuelling supervisor has satisfied himself that there is no risk from heated components.

24.1.1 In checking for high temperature, care shall be taken in approaching the wheels. The wheels shall be approached from the fore or aft and never from the sides.

24.2 Fire extinguishers of a suitable type shall be readily available before the transfer of fuel begins. The straps securing them to the refuelling equipment shall be unfastened before the fuelling operations are started. Adequate number of trained persons shall be readily available to operate these units.

24.3 The fire extinguishers shall be maintained to the standards recommended by their manufacturers (*see IS 5896*).

24.4 Fuelling crew shall be instructed in the procedure for summoning the aerodrome fire service.

24.5 Fuelling operation shall cease when a turboprop jet aircraft manoeuvres so as to bring the rear jet outlets within 50 metres of the fuelling equipment or the aircraft fuelling point and vent system (*see also 26*).

25 SAFETY FROM ELECTRICAL STORMS/ HEAVY RAIN

25.1 Extreme care shall be exercised while fuelling during electrical storms. Fuelling shall be suspended during severe lightning disturbances in the vicinity of the aerodrome or helipad.

25.2 Overwing fuelling shall be suspended during heavy storm/rains.

26 HAZARDS FROM ADJACENT AIRCRAFT OPERATION

Before and during fuelling, it shall be ensured that no hazard arises to the personnel or equipment from the efflux from other aircraft or APUs. If the hazardous conditions exist, fuelling operation shall immediately be suspended until conditions permit resumption of fuelling operations (*see also 24.5*).

NOTE — It may be noted that the engine efflux of modern jet aircraft when taxiing could have speeds up to 65 knots and a temperature above 50°C even at a distance of 30 metres from the exhaust point. This temperature may not be dangerous from the fire point of view, but the personnel and equipment could be affected.

27 MAINTENANCE OF GROUND SERVICING EQUIPMENT USED

All vehicles, their engines and equipment shall be subject to regular inspection and maintenance to preserve safety characteristics. The engine, the electrical and exhaust system of such vehicles shall not make any sparks or flames. Vehicles moving in the danger zone may be fitted with spark arrestors and flame traps if required by the concerned authorities.

28 USE OF PHOTOGRAPHIC FLASH EQUIPMENT

No photographic flash bulbs and electronic flash equipments shall be permitted to be used within 6 metres filling or venting points of an aircraft or fuelling equipment.

29 OPERATION OF RADAR

Aircraft shall not be fuelled within 30 metres of radar equipment under test or in use in aircraft or ground installations.

30 SERVICING AND MAINTENANCE OF AIRCRAFT DURING FUELLING

30.1 While fuelling is in progress, servicing, maintenance test and repair activities shall be carried out subject to the conditions stipulated in 30.2 to 30.13. Aircraft or other maintenance work which may create a source of ignition shall not be carried out while fuelling is in progress.

30.2 All ground equipment, such as platform steps shall be clear of the aircraft. Because after fuelling, the aircraft has a tendency to settle down due to increase in weight and this changed attitude of the aircraft may thus cause damage to the aircraft/such equipment.

30.3 The main engines of the aircraft shall not be operated (except for helicopter, *see* 17). Operation of

APUs and GPUs shall be in accordance with the provision of 22.5 and 22.6.

30.4 Only those switches which are essential in carrying out the fuelling or servicing operation shall be operated when fuelling is in progress.

30.5 Strobe lighting which is likely to give spark shall not be operated.

30.6 All connections between the ground equipment and the aircraft shall be made before the filler caps are removed and shall not be broken until the fuelling ceases.

30.7 In case of the use of battery trolleys, the electrical circuit shall remain unbroken till the fuelling operation is completed.

30.8 Vehicles operating in the fuelling zone shall not pass under or park near the aircraft unless specifically required to do so for maintenance or fuelling purposes.

30.9 Aircraft combustion heaters shall not be used.

30.10 Only checking and limited maintenance work such as the exchange of units shall be carried out on radio, radar and electrical equipment. Testing of such equipments shall be deferred until the fuelling is completed.

30.11 Radio equipment of approved types installed on fuelling and servicing equipment may be operated.

30.12 All hand torches and inspection lamps and their cable connections used in the fuelling zone shall be of explosion proof/intrinsically safe type.

30.13 Only authorized persons and vehicles shall be permitted within the fuelling zone and their number shall be kept to the minimum.

31 TRAINING

It is essential that all personnel connected with the fuelling operations are adequately trained by their employers and are supplied with appropriate instructions and guidance on safe operating procedures. All such personnel shall be fully conversant with the operation of fire fighting equipment provided for the fuelling operations.

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This Indian Standard has been developed from Doc : No. PCD 3 (1565).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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